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Studies on the Rocky Mountain Flora.—V.

BY P. A. RYDBERG

Sporobolus aristatus sp. nov.

Vilfa depauperata var. *filiformis* Wats. King's Exp. 5 : 376, in part (as to the awned form). 1871. Not Thurb.

Perennial with short branching rootstock. Culm usually only 4–6 cm. high : internodes short, usually covered by the open strongly striate sheath ; ligules lanceolate, acute, about 1.5 mm. long ; leaf-blades 8–14 mm. long, and about 1 mm. wide, striate and puberulent on the upper surface : panicle few-flowered, very narrow, with short erect branches ; empty glumes almost equal, or the inner slightly longer, 1–1.25 mm. long, less than half as long as the flowering glume, ovate, acutish or obtuse and somewhat erose at the apex : flowering glume about 2.5 mm. long, strongly veined, long-strigose on the veins and tipped with an awn .5–1 mm. long ; palet almost equal to the flowering glume (awn excepted) in length, acuminate, but not awned, strigose.

This species is closely related to *S. filiformis* (Thurb.) Rydb. differing in the lower habit, less exserted panicle, firmer empty glumes and the presence of a distinct awn. It grows in wet places at an altitude of 2000–2500 m.

WYOMING : Big Horn Mountains, Sheridan Co., 1899, *F. Tweedy*, 2196 (type) ; Spread Creek, 1897, 27.

UTAH : Bear River Cañon, 1869, *S. Watson*, 1281.

Poa platyphylla Nash & Rydb.

Poa trivialis var. *occidentalis* Vasey, Desc. Cat. Grasses 85. 1885. Not *Poa flexuosa* var. *occidentalis* Vasey. 1878.

Poa occidentalis Vasey, Cont. U. S. Nat. Herb. 1 : 275. 1893.

Carex ebenea sp. nov.

Perennial by a cespitose rootstock. Stem 2–4 dm. high, strongly striate ; sheath with a conspicuous membranaceous ligular portion, ligule proper rounded, about 2 mm. long ; leaf-blades flat, 1–2 dm. long, 3–6 mm. broad, strongly nerved : spikelets about 1 cm. long in a dense globular or rounded-conical head :

shining, brownish black with a lighter midrib, lanceolate, acute, 3-4 mm. long: perigynia lanceolate, tapering gradually into a long beak, with the beak about 5 mm. long, dark brown; staminate flowers at the base and mixed with the pistillate: upper portion of the wings and the beak scabrous on the margins; teeth at the apex of the beak very short, subulate: styles 2: achene oblong, lenticular, nearly 2 mm. long and fully 1 mm. broad.

This species is nearest related to *C. festiva* and has been labeled *C. festiva Haydeniana*, but it is not the same as the original of that variety, which has broadly ovate perigynia. *C. ebenca* differs also from all forms of *C. festiva* in the form of the perigynia and in the dark glossy color of the bracts and perigynia.

COLORADO: Pikes Peak, 1900, *F. Clements* (type); Windy Point, 1900; Mt. Harvard, 1896, 7; Grecian Bend, 1896, Bottomless Pit, and Saddle, *Clements*; between Cheyenne Mountain and Seven Lakes, 1896, *E. A. Bessey*; Ironton, 1899, *C. C. Curtis*; Telluride, 1894, *F. Tweedy*, 194; Chambers Lake and Cameron Pass, 1896, *C. F. Baker*; Clear Creek Cañon, 1878, *M. E. Jones*, 267; Silver Plume, 1895, *Rydberg*, 2460; Pagosa Peak, 1899, *C. F. Baker*, 233.

***Streptopus curvipes* Vail sp. nov.**

Simple, glabrous, except the margins of the leaves and the peduncles. Stems 1-3 dm. high, from a slender rootstock covered with few fibrous rootlets: leaves sessile, oval or oblong-lanceolate, 3-8 cm. long, acuminate at the apex, rounded and slightly clasping at the base, 3-5-nerved, the margins finely glandular-ciliate: flowers 3-5, solitary: peduncles not geniculate, 5-15 mm. long, glandular-pubescent: flowers pale purple or rose-colored: perianth-segments lanceolate, 5-7 mm. long, minutely glandular-pubescent on the inner surface: anthers 2-beaked; beaks slender, about half the length of the anther: style 3-cleft, the spreading branches stigmatic along the inner side: berry globose, when mature brick red, 7-9 mm. in diameter: seeds clavate, 3-4 mm. long, with many cross-striate ridges.

Differs from *Streptopus roseus* in its simple habit and the non-geniculate and much shorter peduncles. The beaks of the anthers seem to be a trifle longer than in *S. roseus*. It is closely related to *S. brevipes* Baker, but is larger and coarser in every respect. The flowers of the latter species are not known.

BRITISH COLUMBIA: Asulkan Pass, alt. 4400 ft., June to July,

1897, *Mrs. Zoë W. Palmer* (type); Glacier, alt. 4122 ft., June to July, 1897, *Mrs. Zoë W. Palmer*; Glacier, June, 1897, *Mr. & Mrs. Cornelius Van Brunt*.

ALASKA: Juneau, along the mountain side, July 24, 1891, *Miss Grace E. Cooley*; Yes Bay, July 10, 1895, *Thomas Howell*, 1664 (all in Herb. N. Y. Botanical Garden or Columbia University); *Ferd. Bishoff*.

OREGON: *E. Hall*, 521.

WASHINGTON: Skamania Co., Aug., 1886, *Suksdorf*; Mt. Adams, 3-400 ft., *Suksdorf*, 44; June, 1879, *J. Howell* (the last five specimens in Herb. Gray).

***Vagnera brachypetala* sp. nov.**

A tall stout perennial, 5-8 dm. high. Stem striate, puberulent, especially the upper portion: leaves sessile or short-petioled, oval or ovate, 8-18 cm. long, 4-7 cm. wide, often short-acuminate and twisted at the apex, with 5-7 stronger nerves and numerous weaker ones: panicle on a peduncle 4-5 cm. long, rather dense, 3-10 cm. long and 2-5 cm. broad: petals and sepals oblong, 1-1.5 mm. long, scarcely half as long as the broadly dilated, lanceolate-subulate petaloid filaments: style about .5 mm. long: berry dark purple, about 6 mm. in diameter.

This species is closely related to *V. racemosa* and *V. amplexicaulis*, perhaps most nearly to the former, but is easily distinguished by the short petals and the purple fruit. In *V. racemosa* the petals and sepals are almost as long as the filaments and the fruit is 7-8 mm. in diameter and red with purple spots. *V. brachypetala* grows on hillsides up to an altitude of 2500 m.

BRITISH COLUMBIA: Glacier, at the "Loup," 1897, *Mr. & Mrs. Cornelius Van Brunt* (in fruit, type); Deer Park, Columbia River, 1890, *John Macoun*; Victoria, Vancouver Island, 1893, *John Macoun*, 5998.

WASHINGTON: Seattle, 1891, *C. V. Piper*, 198.

IDAHO: Lake Waha, 1892, *Sandberg*, *MacDougal & Heller*, 228.

***Vagnera leptopetala* sp. nov.**

A slender glabrous perennial, 2-3 dm. high. Rootstock very slender for the genus, white, only about 2 mm. in diameter: stem erect, strict or the upper portion somewhat zigzag, striate and pale: leaves oblong-lanceolate, 6-8 cm. long, 1-2 cm. wide, light

green, sessile, long-acute, with 3-5 stronger nerves and 12-14 weaker ones: raceme terminal, simple, 3-6-flowered: pedicels 5-8 mm. long: petals and sepals linear, acute, about 4 mm. long and less than 1 mm. wide, very thin, white: fruit not seen.

This species is nearly related to *V. stellata* and *V. liliacea*, but differs in the narrow petals and sepals, the slender rootstock and the lighter green foliage. It grows in rich soil in cañons at an altitude of 2000-2100 m.

COLORADO: Headquarters of Sangre de Christo Creek, 1900, *Rydb. & Vreeland*, 6441 (type); Dark Cañon, Pikes Peak, 1900, *Fred Clements*.

***Limnorchis purpurascens* sp. nov.**

A rather stout plant, 3-5 dm. high, with fleshy-fibrous roots. Leaves ovate to lanceolate, acute, 6-10 cm. long, 1.5-3 cm. wide, dark green: bracts lanceolate, the lower exceeding the flowers: spike rather dense: flowers 10-12 mm. long: lateral sepals green, oblong-linear, or linear, obtuse, 4-5 mm. long; the upper sepal tinged with purple, broadly ovate, erect, obtuse: petals slightly shorter, erect, purple, lanceolate, oblique: lip broadly linear-lanceolate, about 5 mm. long, purplish, scarcely at all dilated at the base, the edges almost straight: spur scarcely more than half as long as the lip, much thickened and saccate.

This species belongs to the *L. hyperborea* group, and is perhaps nearest related to that species. It differs, however, in the purple petals and lip and the shorter and more saccate spur. The spur has almost the same form as that of *L. stricta*; but from that species it differs in the dense spike and the broader lip. *L. purpurascens* grows in damp woods at an altitude of 2700-3000 m.

COLORADO: Iron Mountain, 1900, *Rydb. & Vreeland*, 6414 (type); Manitou, 1900, *Fred Clements*, 172; Georgetown, 1878, *M. E. Jones*, 314.

***Piperia* gen. nov.**

Montolivaea Rydb. Mem. N. Y. Bot. Gard. 1: 106. 1900. Not Reichenb.

Professor C. V. Piper of the Agricultural Experiment Station at Pullman, Washington, has called my attention to the fact that the genus *Montolivaea* was based not on *Platanthera elegans* Lindley, or *Habenaria elegans* Bolander; but on *Montolivaea elegans* Reich-

enb., or *Habenaria elegans* Jackson, of a much later date. The genus that I shortly characterized under the name of *Montolivaea* in the Memoir cited above, is therefore without a name. As I find that no genus has at yet been dedicated to Professor Piper, I take the pleasure in naming this for him. The genus contains at least three species, viz.

Piperia elegans (Lindl.)

Platanthera elegans Lindl. Gen. & Sp. Orch. 285. 1835.

Habenaria elegans Boland.; Wats. Bot. Calif. 2: 133. 1876.

Montolivaea elegans Rydb. Mem. N. Y. Bot. Gard. 1: 106. 1900. Not Reichenb.

Piperia Unalaschensis (Spreng.)

Spiranthes Unalaschensis Spreng. Syst. 3: 708. 1826.

Habenaria Unalaschensis Wats. Proc. Am. Acad. 12: 277. 1876.

Montolivaea Unalaschensis Rydb. Mem. N. Y. Bot. Gard. 1: 107. 1900.

Piperia elongata sp. nov.

A slender strict plant, 4-7 dm. high. Corm ellipsoid, about 2 cm. long and 1 cm. in diameter: leaves 2, near the base; blades lanceolate or oblanceolate, acute, 8-15 cm. long, 1-2 cm. wide: spike elongated and lax, 2-3 dm. long: flowers about 1 cm. long: sepals green, about 5 mm. long, the upper lanceolate, the other two linear obtuse: petals lanceolate, oblique, equalling the sepals: lip entire, broadly lanceolate: spur slender, scarcely clavate, almost cylindrical, arcuate, 10-12 mm. long, about .7 mm. thick.

This is somewhat intermediate between the two preceding. It has almost the same flowers as the first and the general habit of the second. *P. elegans*, with which it has generally been confused, has a stouter, more fleshy stem, thicker bracts and a short crowded spike. *P. Unalaschensis* has the same habit as the present species, but the spur is very short and saccate. *P. elongata* grows in open woods, up to an altitude of 700 m.

IDAHO: Priest Lake, near lower end, 1900, *D. T. MacDougal*, 168 (type); Priest River Valley, 134.

WASHINGTON: W. Klickitat County, 1885, *W. N. Suksdorf*; Seattle, 1889, *C. V. Piper*, 1081.

Corallorrhiza Vreelandii sp. nov.

Scape rather stout, 2-4 dm. high, dark purplish brown. Sheaths, especially the lowest one, much inflated, purplish brown with dark purple striations: flowers 6-15, about 15 mm. long, in fruit drooping: sepals oblong, 7-8 mm. long, brown with 3 purple stripes: petals similar but slightly broader and with 4 stripes: lip ovate, entire, with a small gibbosity at the base: spur none.

This is nearest related to *C. striata*, from which it differs in the smaller flowers and narrower sepals and petals. The type was found growing among alders and willows at the margin of a small lake, at an altitude of about 2700 m. It was first discovered by Mr. F. K. Vreeland, my enthusiastic associate and pleasant companion in field work last summer.

COLORADO: Veta Mountain, 1900, *Rydberg & Vreeland*, 6418.

Salix Wyomingensis sp. nov.

A shrub 1 m. high or less. Bark of the main trunk gray; that of the branches dark-brown or grayish, shining, somewhat flaky; young branches appressed-villous; buds brown, shining, pubescent when young: leaves small, rather crowded; petioles 2-4 mm. long; blade oval or obovate, acute, 1-3 cm. long, entire or exceedingly minutely callous-denticulate, upper surface green and shining, slightly pubescent when young, glabrate in age; lower surface pale bluish green, appressed silky-villous: aments borne on very short leafy branches, about 3 cm. long, 8-10 mm. in diameter: bracts brown, oblong or ovate, obtuse: pedicels scarcely 1 mm. long: ovary villous, but green, when fully developed only about 3 mm. long: style .5 mm. long: stigmas short, slightly 2-cleft.

This species is nearest related to *S. glaucops* Anderson, but differs in the small oval or obovate leaves and the much smaller and greener ovaries. It grows at an altitude of 2100-2700 m.

WYOMING: Eastern Slope of Big Horn Mountains, headwaters of Clear Creek and Crazy Woman River, 1900, *F. Tweedy*, 3434 (type) and 3433.

Salix stenophylla sp. nov.

A shrub 2-5 m. high. Bark of older stems light brownish green, smooth; that of the slender strict branches brown: young shoots silvery pubescent: leaves narrowly linear, 3-7 cm. long, about 3 mm. wide, acute, entire or minutely and distantly denticulate, permanently finely silky strigose, but not white: pistillate

aments 3–4 cm. long at the ends of short leafy branches: bracts yellow, oblanceolate, deciduous, acute, 2–2.5 mm. long, rather sparingly silky-villous: pistil green, about 4 mm. long, glabrous except the swollen portion at the end just below the red stigma: stipe about 1 mm. long: style none: stigma minutely 4-lobed: fruit glabrous, narrowly ovoid-conic, about 6 mm. long, and 1.5 mm. in diameter: staminate aments 2–3 cm. long, 5 mm. in diameter: bracts like those of the pistillate aments, but more obtuse and more villous: stamens 2, about twice as long as the bracts: filaments slightly hairy, especially below.

This species is a member of the *longifolia* group and nearest related to *S. exigua* Nutt., at least as understood by Professor Rowlee; but differs in the narrower leaves, the distinct stipe and the peculiar swelling just below the stigma. It grows on river banks up to an altitude of 2500 m.

COLORADO: Cuchara River, below La Veta, 1900, *Rydberg & Vreeland*, 6392 (staminate flowers) and 6393 (pistillate, type); Mancos, 1898, *Baker, Earle & Tracy*, 127 (staminate) and 102 (pistillate in fruit).

NEW MEXICO: 1851–2, *Wright*, 1874 and 1875; 1847, *Fendler*, 813.

ARIZONA: San Francisco Mountains, 1881, *Rusby*, 371.

***Salix padifolia* sp. nov.**

A shrub 1–7 m. high, with light brown smooth bark. Young twigs strict, glabrous and shining, yellow, or often brown or purple: stipules ovate or rounded, glandular-dentate: leaves with petioles 5–8 mm. long; blade oval or broadly elliptic, crenate, short-acute or obtusish, rounded at the base, 3–5 cm. long, 1.5–2 cm. wide, when young sparingly covered with silky hairs, but soon glabrate, dark green above, paler beneath: pistillate aments 3–4 cm. long, densely flowered, appearing usually before the leaves, borne on very short branches and subtended by 1–4 small leaves: bracts obovate, fuscous, covered on the outside with white wool: pistils nearly sessile, glabrous: style about 1.5 mm. long: stigmas 2, nearly 1 mm. long, 2-cleft: capsules ovate-conic, about 6 mm. long: staminate aments almost sessile, 2–3 cm. long, 10–12 mm. in diameter: bracts as those of the pistillate aments: stamens 2; filaments glabrous.

This is a species of the *cordata* group and nearest related to *S. Mackenziana*; but differs in the shorter oval leaves, the shorter and thicker aments and the exceedingly short stipes. It has gen-

erally been referred to *S. cordata*; but has much thicker and shorter aments and the leaves are quite different, thin, very short and broad, never acuminate and never sharply serrate. It grows along streams at an altitude of 2000–3000 m.

COLORADO: Tributaries of Turkey Creek, 1900, *Rydberg & Vreeland*, 6389 (fruit, type); Ojo, 6386 (staminate) and 6387 (pistillate); Pass Creek, 6388 (pistillate); Los Pinos, 1899, *Baker*, 271; Bob Creek, 1898, *Baker, Earle & Tracy*, 175; Silverton, 1895, *F. Tweedy*, 268 (?).

WYOMING: Golden Gate, 1899, *Aven & Elias Nelson*, 5549.

MONTANA: Ten miles east of Monida, 1899, *Aven & Elias Nelson*, 5427.

***Salix flava* sp. nov.**

A shrub or small tree, 4–7 m. high, with grayish yellow rough bark. Branches short and divergent, light yellow, smooth and shining: stipules rounded, entire: leaves with petioles 2–6 mm. long; blades lanceolate, short-acuminate or acute, entire or indistinctly crenulate, rather firm, yellowish green, glabrous on both sides, 3–7 cm. long: pistillate aments 2–3 cm. long, almost sessile, subtended by 1–2 leaves or naked: bracts very short, obovate, fuscous, densely long-woolly: pistil stipitate, glabrous; stipe in fruit often 2 mm. long: style about .5 mm. long: stigmas oblong, subtire: capsule ovate, about 6 mm. long: staminate aments 2–3 cm. long, sessile: bracts as in the pistillate aments: stamens 2; filaments glabrous.

This is also a member of the *cordata* group and nearest related to *S. lutea* Nutt., differing in the less acuminate and subtire leaves, which are not paler beneath, and the longer stipes. It grows along streams at an altitude of 1500–2000 m.

WYOMING: Green River, 1895, *Rydberg* (type); Spread Creek, 1897, *F. Tweedy*, 302.

MONTANA: Boulder River, 1888, *F. Tweedy*, 63.

IDAHO: Beaver Cañon, 1895, *Rydberg*.

NEVADA: Unionville, 1868, *S. Watson*, 1097.

UTAH: Wahsatch Mountains, 1869, *S. Watson*, 1096, in part.

COLORADO: South Park, 1873, *J. Wolfe*; Cucharas Valley, near La Veta, 1900, *Rydberg & Vreeland*, 6377; Manitou, 1878, *M. E. Jones*, 30.

***Blitum hastatum* sp. nov.**

A slender annual, 2–4 dm. high. Leaves very thin; blades

3-7 cm. long, ovate or ovate-lanceolate in outline, but often hastately lobed at the base, which is broadly cuneate and decurrent on the slender petiole; the upper ones smaller and generally not hastate: lower petioles 2-4 cm. long; flowers in small glomerules in the upper axils and on a slender interrupted terminal spike: seeds brownish black, smooth and shining, about 1 mm. long.

This species differs from *B. capitatum* in the hastate or entire, never toothed, thin leaves and in the inflorescence which is more inclined to be naked above, more lax and with smaller glomerules. It grows at an altitude of 2000-3000 m.

WYOMING: Buffalo, 1900, *F. Tweedy*, 3295 (type).

UTAH: Alta, Wahsatch Mountains, 1879, *M. E. Jones*, 1181.

NEVADA: Above Thousand Springs Valley, 1868, *S. Watson*, 977.

***Alsine Curtisii* sp. nov.**

Slender, erect, branched, 2-6 dm. high with a slender horizontal rootstock. Stem sharply 4-angled, glabrous, except at the inflorescence: leaves linear or lance-linear strongly 1-nerved, sessile, rounded and half clasping at the base, long-attenuate at the apex, 3-6 cm. long, 3-5 mm. wide, those of the inflorescence smaller: branches of the many-flowered cymes divergent, very viscid-pubescent: sepals about 3 mm. long, thick, ovate-oblong, obtuse or acutish with a narrow white margin: petals about 7 mm. long, cuneate with a broad and deep sinus at the apex: seeds very few, dark brown, almost 2 mm. in diameter.

This species is nearest related to *A. Jamesii* and has been confused with it; the differences are mostly in the leaves and sepals. In *A. Curtisii* the former are scarcely half as wide as those of *A. Jamesii*, and the sepals of the former are rather thick while in the latter almost membranous. *A. Curtisii* grows at an altitude of 1800 to 3000 m.

WYOMING: Headwaters of Cliff Creek, 1900, *C. C. Curtis* (type).

UTAH: Wahsatch Mountains, 1869, *S. Watson*, 159 (in part); Beaver Valley, 1877, *E. Palmer*, 51 1/2; Alta, Wahsatch Mountains, 1879, *M. E. Jones*, 1160.

NEVADA: East Humboldt Mountains, 1868, *S. Watson*, 159 (in part).

ARIZONA: Mogallon Mountains, 1881, *H. H. Rusby*.

***Arenaria confusa* sp. nov.**

A slender diffuse plant with caespitose, perennial, but not ligneous base. Stems slender, branched, 4–6 dm. long, finely puberulent: leaves opposite, linear-lanceolate, pointed, with a strong midrib, puberulent, 1–2 cm. long: pedicels in fruit divergent, about 1 cm. long, slightly bent under the calyx: sepals linear-lanceolate, acuminate, scarious-margined, not tuberculate-punctate, about 3 mm. long: petals about three fourths as long as the sepals: capsule broadly ovoid, about 4 mm. long.

This species is related to *A. lanuginosa* and *A. saxosa*, and somewhat intermediate between the two. In habit it resembles most the former, but does not have the subverticillate or fascicled leaves; the sepals are narrowly lanceolate instead of ovate and not tuberculate-punctate, the stem is not retrorsely pubescent as in that species and the petals are larger. In all specimens of *A. lanuginosa* seen by me the petals are either lacking or not more than half as long as the sepals. *A. saxosa* is subligneous at the base, has low stems, short leaves, mostly less than 1 cm. long and sepals even in flower 4–5 mm. long. Dr. B. L. Robinson, in the Synoptical Flora, remarks under *A. alsinoides* (*A. lanuginosa*): "A more western form, represented from New Mexico by Fendler's 58 and 62 and Wright's 864, has slightly firmer stems, more numerous subpaniculate flowers, and leaves less narrowed at the base. In all these respects it shows a transition to the following." I have not seen the numbers of Fendler's collection cited; but Wright's 864 as represented in Columbia University Herbarium belongs to *A. confusa*. On the sheet of Rusby's 38, cited below, found in the Columbia University herbarium, Dr. Robinson has written in pencil: "Apparently this is merely a lax form of *A. saxosa* Gray. The earliest leaves are crowded, the upper internodes much elongated, and later flowers are always smaller. (B. L. R.)" Wilcox's plant cited below was also determined by Dr. Robinson as *A. saxosa*. Both of these agree perfectly, however, with Wright's specimens; but neither with our material of *A. lanuginosa* from the Southern States and Mexico, nor with the type of *A. saxosa*. *A. confusa* grows in cañons at an altitude of 2000–3500 m.

NEW MEXICO: White Mountains, 1897, *E. O. Wootton*, 295 (type); 1851, *C. Wright*, 864; Burrow Mountains, 1880, *H. H. Rusby*, 38.

ARIZONA: Ft. Huachuca, 1892, *T. E. Wilcox*; Rincou Mountains, 1891, *Neally*, 119; Flagstaff, 1894, *J. W. Toumey*.

COLORADO: La Plata Mountains, 1896, *F. Tweedy*, 426; Wahatoya Creek, 1900, *Rydberg & Vreeland*, 6274; Pagosa Peak, 1899, *C. F. Baker*, 309.

***Delphinium ramosum* sp. nov.**

A tall perennial, often 2 m. high. Stem glabrous and shining up to the inflorescence, often tinged purplish or bluish: petioles 1–1.5 dm. long; leaf-blade glabrous above, finely puberulent beneath, divided near the base into 5–7 segments, which are 4–7 cm. long, oblanceolate or obovate, cuneate in outline, unequally 3-cleft and these segments again cleft into oblong or lanceolate lobes 3–6 mm. broad: inflorescence with slender branches, these sparingly and finely puberulent: bracts linear-subulate, 5–10 mm. long: pedicels slender, 1–3 cm. long: bractlets filiform, 2–5 mm. long, inserted 2–5 mm. below the calyx: sepals dark blue, striately nerved, slightly brownish at the base, about 1 cm. long, ovate; the upper and lower ones acute; the lateral ones obtuse, all puberulent: spur about 1 cm. long, straight, or slightly curved at the apex: upper petals dirty-white, tinged with brown and blue, about 8 mm. long: spur slender, almost 1 cm. long: lateral petals dark blue, bearded, with a slender claw, somewhat corniculate, bent at right angles and only slightly 2-lobed at the apex: follicles 3, 12–15 mm. long, somewhat spreading and with divaricate beaks.

This species has without doubt been included in *D. scopulorum*, but is evidently distinct from the type of that species. It is taller, with more branched inflorescence, glabrous stem and the flowers are usually tinged with brown at the base. The type of *D. scopulorum* has narrow, very acute and divergent lobes of the leaves and the calyx is purely dark blue. *D. ramosum* grows at an altitude of 2000–3000 m.

COLORADO: North Cheyenne Cañon, 1896, *E. A. Bessey* (type); also in Williams Cañon, Artists Glen and other places near Pikes Peak; "Colorado," 1889, *Alice Eastwood*.

***Delphinium robustum* sp. nov.**

A tall and stout perennial, often 2 m. high or more. Stem leafy, striate, puberulent throughout, often 1 cm. in diameter at the base; petioles 1–2 dm. long, puberulent; leaf-blade finely and

sparingly puberulent on both sides, divided to the base into 5-7 segments, which are 6-12 cm. long and twice cleft into linear lobes 3-5 mm. broad: inflorescence branched, densely many-flowered: pedicels 1-3 cm. long, rather stout, usually equalled or surpassed by the linear bracts: bractlets filiform, 5-10 mm. long, inserted close under the calyx: sepals dark blue, paler at the base, elliptical, all except the upper one obtuse, 12-15 mm. long; spur 12 mm. long, slightly curved: upper petals narrow, light brownish, striate: lateral petals with slender claws bent at right angles, bearded only within, deeply 2-cleft at the apex.

This species in perhaps closest related to *D. cucullatum* A. Nelson but differs in the longer and narrower leaf-segments, the more branched inflorescence, the stouter habit, the longer bracts and bractlets and narrower upper petals. It grows at an altitude of about 2500 m.

COLORADO: Wahatoya Creek, below the Spanish Peaks, 1900, *Rydberg & Vreeland*, 6217 (type); Colorado Springs, 1895, *E. A. Bessey*; Ruton, 1840, *Albert*.

***Erysimum alpestre* (Cockerell)**

Erysimum asperum f. *alpestre* Cockerell, Bull. Torr. Club, 18: 168. 1891.

A tall strigose perennial with a deep tap-root: stem strict, simple, 3-6 dm. high, striate: basal leaves linear or narrowly linear-oblongate, 5-10 cm. long, 2-7 mm. wide, subentire or sinuately denticulate, grayish strigose, gradually tapering below with a short petiole: stem leaves mostly narrowly linear, the upper sessile: raceme at first short and corymbiform, in fruit much elongated: pedicels short, in fruit scarcely 1 cm. long, ascending: calyx 10-12 mm. long, yellow: two of the sepals strongly saccate at the base: petals with slender claws: blades broadly obovate-cuneate, slightly emarginate, about 8 mm. long and broad, varying from orange or brown to rose-purple or the older pale yellow: pods four-angled, slender, erect, 7-8 cm. long and 1.5 mm. in diameter: style about 2 mm. long, stout.

In general habit, this species closely resembles *E. asperum*. Mr. Cockerell, who seems to have been the first to observe this interesting plant of the Sangre de Christo region, took it to be a form of *E. asperum* with peculiarly colored petals, found only at high altitudes. I was first of the same opinion until I saw the fruit in the type number and still better developed in Mr. Bessey's

specimens. This resembles more that of *E. asperrimum* (*Cheiranthus asperrimum* Greene) than that of *E. asperum*. The present species is also less densely and more finely strigose than either of them. *E. alpestre* grows at an altitude of 2500 m. or more.

COLORADO: Headwaters of Pass Creek, 1900, *Rydberg & Vreeland*, 6200 (type); mountain near Veta Pass, 6199; Veta Mountain, 6197; tributary of Turkey Creek, 6198; East Indian Creek, 6196; Ojo, 6202; Bald Mountain, near Pikes Peak, 1896, *E. A. Bessey*.

***Draba aureiformis* sp. nov.**

A slender grayish stellate plant with perennial tap-root: stem strict, 2–4 dm. high, simple or branched above, with slender erect branches: basal leaves spatulate, 2–3 cm. long, acute, entire: stem-leaves closely sessile, oblong-lanceolate, acute, entire or sinuately denticulate: petals sulphur yellow, 3–4 mm. long, broadly spatulate: pedicels ascending: pod erect, linear-oblong-lanceolate, 10–15 mm. long, about 3 mm. wide, slightly if at all twisted, stellate: style about 1 mm. long.

This species is nearest related to *D. aurea*, but characterized by the small light yellow petals, the slender style, the less dense pubescence, and slender stem. It grows in dry soil at an altitude of 2700–3300 m.

COLORADO: Headwaters of Pass Creek, 1900, *Rydberg & Vreeland*, 6157 (type); Middle Park, 1861, *C. C. Parry*, 103; Graymount, 1885, *G. W. Letterman*, 28.

***Physaria vitulifera* sp. nov.**

A densely tufted finely stellate-pubescent perennial with deep tap-root. Basal leaves numerous, fiddle-shaped, the larger 4–5 cm. long; terminal lobe nearly orbicular to broadly obovate, subentire, obtuse; upper sinuses rounded: lateral lobes 1–2 pairs, much smaller: stems ascending, or decumbent, 1–2 dm. high: stem-leaves 1–2 cm. long, obovate or oblanceolate, entire: pedicels short, usually curved in fruit: sepals about 4 mm. long, oblong, acute: petals clawed, 8–9 mm. long: fruit obtuse at the base, deeply divided above; cells much inflated, round-obovate, divergent, about 5 mm. in diameter: style about 5 mm. long.

This species, as well as the two following, differs from *P. didymocarpa* in the smaller fruit, which is divided only above, not at

the base. In this respect they resemble *P. Newberryi*; but the fruit is much smaller and not flattened on the sides. *P. vitulifera* differs from the following in the form of the leaves and the curved pedicels. It grows in dry places at an altitude of about 2500 m.

COLORADO: Idaho Springs, 1895, *P. A. Rydberg* (type); Middle Park, 1861, *C. C. Parry*, 101.

***Physaria floribunda* sp. nov.**

Densely tufted perennial with thick tap-root. Flowering stems very numerous, ascending or almost erect, 1–2.5 dm. high: basal leaves less crowded and more erect than in the preceding, oblanceolate or spatulate, sinuately toothed, acute, 5–10 cm. long: stem-leaves oblanceolate, entire, about 3 cm. long: sepals about 5 mm. long, linear-lanceolate: petals bright yellow, 8–9 mm. long, oblanceolate with broad claws: fruit obtuse or slightly cordate at the base, deeply divided above: cells much inflated, about 8 mm. in diameter, almost globular: style 6 mm. long.

In the size and form of the fruit, this species is intermediate between the preceding and *P. didymocarpa*; but it is taller than either. Sometimes the leaves are deeper sinuate, and then become slightly fiddleform; but the terminal lobe is sinuately toothed and acutish. From *P. didymocarpa* it differs in the smaller fruit, which is less cordate at the base, and the longer, more acute leaves. It grows in loose sandy soil in mountain valleys at an altitude of 2000–2700 m.

COLORADO: Sangre de Christo Creek, 1900, *Rydberg & Vreeland*, 6135 (type) and 6136; Hills about Golden, 1892, *Crandall*, 53.

***Physaria acutifolia* sp. nov.**

A small tufted perennial with a deep rather slender tap-root. Basal leaves numerous, 1.5–2.5 cm. long, oblanceolate or obovate, acute, entire or slightly wavy, very finely stellate: stem-leaves rather few, oblanceolate: flowering stems 4–6 cm. long, ascending or depressed: fruit small, obtuse or slightly cordate at the base, deeply divided above: cells inflated, almost spherical, 4–6 mm. in diameter: style about 5 mm. long.

This species differs from *P. didymocarpa* in the smaller size, in the acute leaves, and the smaller fruit, which is more deeply divided above and less so below. In general habit it resembles more *P. Geyeri*, from which it differs in the turgid more spherical cells. It grows in the mountains, reaching an altitude of 3000 m.

COLORADO: Grand Junction, 1893, *Alice Eastwood* (type).

WYOMING: Mount Leidy, 1897, *F. Tweedy*, 391.

***Cardamine cardiophylla* sp. nov.**

Stem stout, 3–10 dm. high, densely hirsute with short white hairs, almost pilose: leaves rounded-cordate or the lower reniform, simple, coarsely sinuately toothed: blades 3–4 cm. broad, more or less pubescent: petioles more or less densely pilose, those of the basal leaves 5–8 cm. long, those of the upper stem-leaves very short: sepals also pubescent, about 3 mm. long: petals white, broadly spatulate, about 8 mm. long: pedicels in fruit spreading, 1.5–2 cm. long: pods 2.5–3.5 cm. long, ascending, 1.5 mm. wide.

This species is nearest related to *C. cordifolia*, and differs mainly in the thicker leaves and the dense pubescence. It reaches an altitude of 3300 m.

COLORADO: Tennessee Pass, Lake County, 1900, *Geo. E. Osterhout*, 2178 (type); 1893, *De Alton Saunders*; Camp beyond Bent's Fort, 1845, *Fremont*, 429.

***Thlaspi Coloradense* sp. nov.**

Perennial; rootstock or caudex cespitose, the branches rosuliferous at the apex. Basal leaves broadly spatulate, 1–2 cm. long, fleshy, 4–7 mm. wide, sinuately crenate or subentire: flowering stems 2–8 cm. long, leafy: stem-leaves oblong or obovate, 3–10 mm. long, obtuse: inflorescence short and dense, even in fruit seldom over 2 cm. long: sepals rounded-ovate, obtuse, with a white margin, about 2 mm. long: petals large, obovate-spatulate, 5–6 mm. long: silicle obovate, about 6 mm. long, only slightly emarginate at the apex: wing-margins very narrow; carina on the sides rather prominent: seeds red, about 1 mm. long.

This species has been included by American authors in *T. alpestre*, which is not found in America. The European species has very small flowers and a different pod which is obcordate with a narrow and deep sinus at the apex. Professor Greene has determined *T. Coloradense* as *T. Fendleri* Gray. The latter was described from flowering specimens and might be the present species; at least it is much like it. Specimens in fruit from the same region as the type of *T. Fendleri* were collected later and were referred by Dr. Gray to *T. Fendleri*; in these the fruit is larger, decidedly inverted triangular in outline, broader margined at the corners and almost truncate at the apex.

T. Coloradense grows at an altitude of 2500 m. or more, among rocks.

COLORADO: Bald Mountain near Pikes Peak, 1896, *E. A. Bessey* (type); South Cheyenne Cañon, Colorado Springs, 1900, *Rydborg & Vreeland*, 6126; West Spanish Peak 6127 and 6128; Pikes Peak, 1894, *E. A. Bessey*; Pikes Peak and Baldy, 1896, *F. Clements*; Pikes Peak and Tennessee Pass, 1893, *De Alton Saunders*; Laramie County, 1893, *C. S. Crandall*, 60; Pikes Peak, 1891, *Dr. E. Penard*, 54; Arapahoe, 55; Los Pinos, 1899, *C. F. Baker*; Cheyenne Mountain and Seven Lakes, 1896, *E. A. Bessey*.

***Thlaspi purpurascens* sp. nov.**

Perennial with a tap-root crowned by a very short caudex and a rosette of leaves; flowering stems generally several, less than 1 dm. high: basal leaves oval or broadly spatulate, 2–3 cm. long, petioled, usually more or less sinuate-dentate: stem-leaves ovate, obtuse, with a truncate base, closely sessile: sepals 2.5–3 mm. long, oblong-oval, obtuse, purplish with broad white margins: petals broadly spatulate, about 6 mm. long: silicle triangular-obovate, distinctly winged above and with a very broad and shallow sinus at the apex, 7–8 mm. long.

This species is closely related to the preceding and intermediate forms are not lacking. The principal difference is in the fruit, which in *T. purpurascens* is comparatively broader, distinctly winged and with a broad and open sinus at the top, almost truncate and less keeled on the sides. The sepals in all specimens seen are purplish and broader, the stem leaves are larger, more ovate and usually with a truncate base, and the branches of the caudex are very short.

ARIZONA: 1876, *E. Palmer*, 571 (type); San Francisco Mountains, 1881, *H. H. Rusby*, 28; 1887, *Dr. E. A. Mearns*, 34; Flagstaff, 1898, *D. T. MacDougal*, 228.

COLORADO: Headwaters of Sangre de Christo Creek, 1900, *Rydborg & Vreeland*, 6125; Iron Mountain, 6124.

***Sophia glandulifera* sp. nov.**

Biennial. Stem simple below, branched above, about 6 dm. high, slightly grayish pubescent with branched hairs, decidedly glandular-viscid above; branches spreading, with upwardly curved ends: leaves pubescent and viscid, bipinnately divided; segments

linear-lanceolate or of the upper leaves filiform, acute or attenuate : flowers light yellow : petals scarcely exceeding the sepals : pedicels very short in flower ; in fruit 4–6 mm. long, ascending or almost erect : pods 8–10 mm. long, erect, more or less curved, especially those of the branches, scarcely exceeding 7 mm. in width, more or less constricted between the seeds ; beak slender, short, about .5 mm. long : seeds uniserial, red, a little over 1 mm. long.

This species has the short pedicels and erect pods of *S. Hartwegiana*, but the pod of the latter is more slender, and often curved, the whole plant is greener and conspicuously glandular, and the segments of the leaves are more slender. The latter character and the short ascending or erect pedicels distinguish it from *S. incisa* Engelm. It grows at an altitude of 1000–1500 m.

WYOMING : Rolling plains between Sheridan and Buffalo, 1900, *F. Tweedy*, 3592.

***Sedum frigidum* sp. nov.**

Perennial with a fleshy rootstock, dioecious. Stems usually less than 1 dm. high, light green : leaves flat, 1–1.5 cm. long and 5–7 mm. wide, sessile, obovate or oblong-obovate, often dentate above the middle, or entire, acute : inflorescence dense, usually dark purple : flowers 4–5-merous, usually 5-merous : sepals of the staminate flowers lanceolate, acute, 1.5–2 mm. long, dark purple or rarely greenish : petals oblanceolate or oblong, acute, about 3 mm. long, dark purple or very rarely greenish tinged with purple : filaments filiform, purple, about one third longer than the petals, the pistillate similar but with somewhat shorter and more obtuse petals : follicles 3–5 mm. long, oblong, with a very short beak about .5 mm. long, divergent or at last recurved.

This species has gone under the name of *S. roseum* (L.) Scop., but is quite unlike the northern European plant, which must be regarded as the type of *Rhodiola rosea* L. This has a very short, almost tuberous rootstock, more oblanceolate leaves about 3 cm. long, usually with very sharp dentations, usually yellow petals, longer filaments almost twice as long as the petals and follicles, 6–8 mm. long. This form is also found in the mountains of southern Europe ; but there seems to be another European plant ; this is described and figured under the name *Rhodiola rosea* in the “Flora von Deutschland” published by Schlechtendal, Langethal and Schenk. It resembles more the Rocky Mountain plant in the purple, flowers and short stamens, but it has more inversely deltoid leaves,

the fertile flowers have very minute petals or none and the follicles have long beaks. In all systematic botanies of Scandinavia and Russia, *S. roseum* is described as having yellow petals, which is never the case in the Rocky Mountain and Alaskan plants. In this respect plants from eastern North America agree with the European.

S. frigidum is an alpine-arctic plant growing in Colorado at an altitude of 3000 m. or more. In Montana it is found at an altitude of about 2700 m. and in Alaska at low altitudes. It grows among rocks, associating with several species of *Saxifraga* and *Adoxa Moschatellina*.

MONTANA: Old Hollow Top, 1897, *Rydberg & Bessey*, 4248 (type); Long Baldy, 1896, *Flodman*, 513; Haystack Peak, 1899, *P. Koch*.

COLORADO: West Spanish Peak, 1900, *Rydberg & Vreeland*, 6112 (♀); 6114 (♂) and 6115 (with greenish, merely purple-tinged flowers); Grayback Mining Camp, 6116; Pikes Peak, 1900, *F. Clements*; 1821, *Dr. James*; Arapahoe Peak, 1891, *Dr. E. Penard*; Pikes Peak, 1894, *E. A. Bessey*; 1893, *De Alton Saunders*.

NEVADA: Mineral King, Sierra, Nevada, 1891, *Coville & Funston*, 1529.

IDAHO: Packsaddle Peak, 1892, *Sandberg, MacDougal & Heller*, 860.

WASHINGTON: Mt. Paddo, 1886, *W. H. Suksdorf*, 859.

ALASKA: Muniak Island, 1891, *Jas. M. Macoun*, 48; Shumagin, 1871-1872, *M. W. Harrington*; King Island, 1897, *E. A. McIlhenny*, 83.

***Sedum polygamum* sp. nov.**

Perennial with a thick fleshy rootstock. Stem 1-3 dm. high: leaves obovate or oblanceolate, acute, sessile, flat, entire or minutely denticulate, 1.5-2.5 cm. long: inflorescence dark purple, dense: flowers dioecio-polygamous: sepals of the staminate ones lanceolate, 2 mm. long, acute: petals oblanceolate, dark purple, about 3 mm. long: filaments about half longer than the petals, purple, broader than in the preceding species, abruptly acuminate above: fertile flowers with more lanceolate petals and usually with stamens which however have shorter filaments scarcely exceeding the petals: follicles 6-8 mm. long with an ascending or spreading beak, about 1 mm. long.

This species is closely related to the preceding, but is stouter, the fertile flowers usually with stamens, the follicles larger and with less divaricate beaks. It has also been included in *S. roseum*, but is really nearer related to *S. atropurpureum* of eastern Asia, which however has larger leaves. *S. polygamum* grows at an altitude of 3000 m. or more.

COLORADO: West Spanish Peak, 1900, *Rydberg & Vreeland*, 6113 (type); Silverton, 1895, *F. Tweedy* 124; Mt. Hesperus, 1898, *Baker, Earle & Tracy*, 481; Basin Creek, La Plata Mountains, 480; Mt. Lincoln, 1873, *J. M. Coulter*; Chambers Lake, 1894, *C. S. Crandall*.

NEW MEXICO: White Mountains, 1897, *E. O. Wootton*, 677.